The Energy Gradient is a Unified Formula for all Fundamental Forces

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Abstract. Scientists around the world have been looking for a unified physics formula for over a hundred years. But this formula has been known since the time of Newton. This formula is very simple - the force **F** is equal to the energy W gradient: **F** = gradW (1). This formula of the force (1) rarely used in the calculations. We use the calculations mainly according to Newton's formula when the force **F** is equal to the mass m multiplied by the acceleration **a**: **F**=m**a** (2), where acceleration is the first derivative of velocity **v** with respect to time t or acceleration is the second derivative of the displacement x with respect to time t. Which formula is the main? The basic formula is: **F** = gradW (1). From the basic formula (1) all other formulas are derived including formula (2) and the law of universal gravitation. Formula (2) is secondary. Why the basic formula (1) is still in the shadows? The fact is that the energy gradient is based on the condition that energy fills all space-time like the ocean. This is an energy ocean. However, the Standard Model (SM) of Physics considers the zero energy level of a physical vacuum. But the zero energy gradients are zero. In a cosmic vacuum with a zero energy level should be no forces. But this contradicts the observed facts. In space there is a lot of forces and energy. It turns out that SM is a fake. In quantum the theory of Superunification I corrected all the errors of SM. In 1996, I discovered superstrong electromagnetic interaction (SEI) - the fifth force (Superforce). SEI is the global energy field of the universe with the maximum level of energy. The SEI field has gradients of energy levels and it is heterogeneous. These energy gradients describe the action of all fundamental forces [1, 2].
Keywords: energy gradient, fundamental forces, theory of Superunification, superstrong electromagnetic interaction, fifth force (Superforce).

We write down the forces **F** through the energy W gradient and as the multiplication of mass m by acceleration **a**:

$$\mathbf{F} = \mathrm{gradW} \quad (1)$$

$$\mathbf{F} = \mathrm{m}\mathbf{a} \quad (2)$$

Which formula (1) or (2) is the main? Next we prove that gradW (1) is a basic formula for the force **F** in physics, and the formula (2) is derived from the formula (1). In the theory of Superunification [1, 2] we have a global energy W field as a function of coordinates (x, y, z) [3,4]:

$$W = f(x, y, z) \quad (3)$$

The global energy field W (3) is a scalar field. The energy gradient (1) already describes a vector force field, which has the direction and magnitude of the fastest change in the energy W in partial derivatives and is written using the Hamilton operator (nabla-operator) ∇ in a rectangular coordinate system:

$$\mathbf{F} = \mathrm{gradW} = \nabla W = \frac{\partial W}{\partial x}\mathbf{i} + \frac{\partial W}{\partial y}\mathbf{j} + \frac{\partial W}{\partial z}\mathbf{k} \quad (4)$$

where **i, j, k** are unit vectors along the x, y, z axes, respectively.

The energy gradient (4) is a vector function. The modulus of force F is determined by the square root of the sum of squares:

$$F = |\mathrm{gradW}| = \sqrt{\left(\frac{\partial W}{\partial x}\right)^2 + \left(\frac{\partial W}{\partial y}\right)^2 + \left(\frac{\partial W}{\partial z}\right)^2} \quad (5)$$

The direction **n** of the force **F** (1) as an energy gradient vector is determined by dividing the function (4) by its module (5):

$$\mathbf{n} = \frac{\mathrm{gradW}}{|\mathrm{gradW}|} = \frac{\frac{\partial W}{\partial x}\mathbf{i} + \frac{\partial W}{\partial y}\mathbf{j} + \frac{\partial W}{\partial z}\mathbf{k}}{\sqrt{\left(\frac{\partial W}{\partial x}\right)^2 + \left(\frac{\partial W}{\partial y}\right)^2 + \left(\frac{\partial W}{\partial z}\right)^2}} \quad (6)$$

To simplify the calculations, we write the energy gradient W (4) in partial derivatives for one coordinate x:

$$\mathbf{F} = \frac{\partial W}{\partial x} \quad (7)$$

Then we multiply the left and right sides of equation (7) by the time increment ∂t:

$$\mathbf{F}\partial t = \frac{\partial W}{\partial x}\partial t \quad (8)$$

We transform (8) according to the rules of differentiation:

$$\frac{\partial W}{\partial x}\partial t = \frac{\partial W}{\partial x / \partial t} = \frac{\partial(0.5mv^2)}{v} = m\partial\mathbf{v} \quad (9)$$

where $\partial x/\partial t = \mathbf{v}$ is the velocity, m/s;

$W = 0.5mv^2$ is kinetic energy, J.

We substitute (9) into (8) and obtain the equality of the impulse of force Ft and the momentum mv in differential form:

$$\mathbf{F}\partial t = m\partial\mathbf{v} \quad (10)$$

From (10) we obtain the equation of Newtonian dynamics when the force is equal to multiplying the mass m of the body by its acceleration **a**:

$$\mathbf{F} = m\frac{\partial\mathbf{v}}{\partial t} = m\mathbf{a} \quad (11)$$

Thus, we have proved that the basic equation is the energy gradient (1), and (10 and (11) are secondary equations. This energy gradient is created due to the electromagnetic structure of quantized space-time in the form of the global energy field SEI. SEI is the global energy field of the universe with the maximum level of energy. The SEI field has gradients of energy levels and it is heterogeneous. These energy gradients describe the action of all fundamental forces Newton's equations (10 and (11) can work only in the presence of a global energy field SEI [1-15].

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